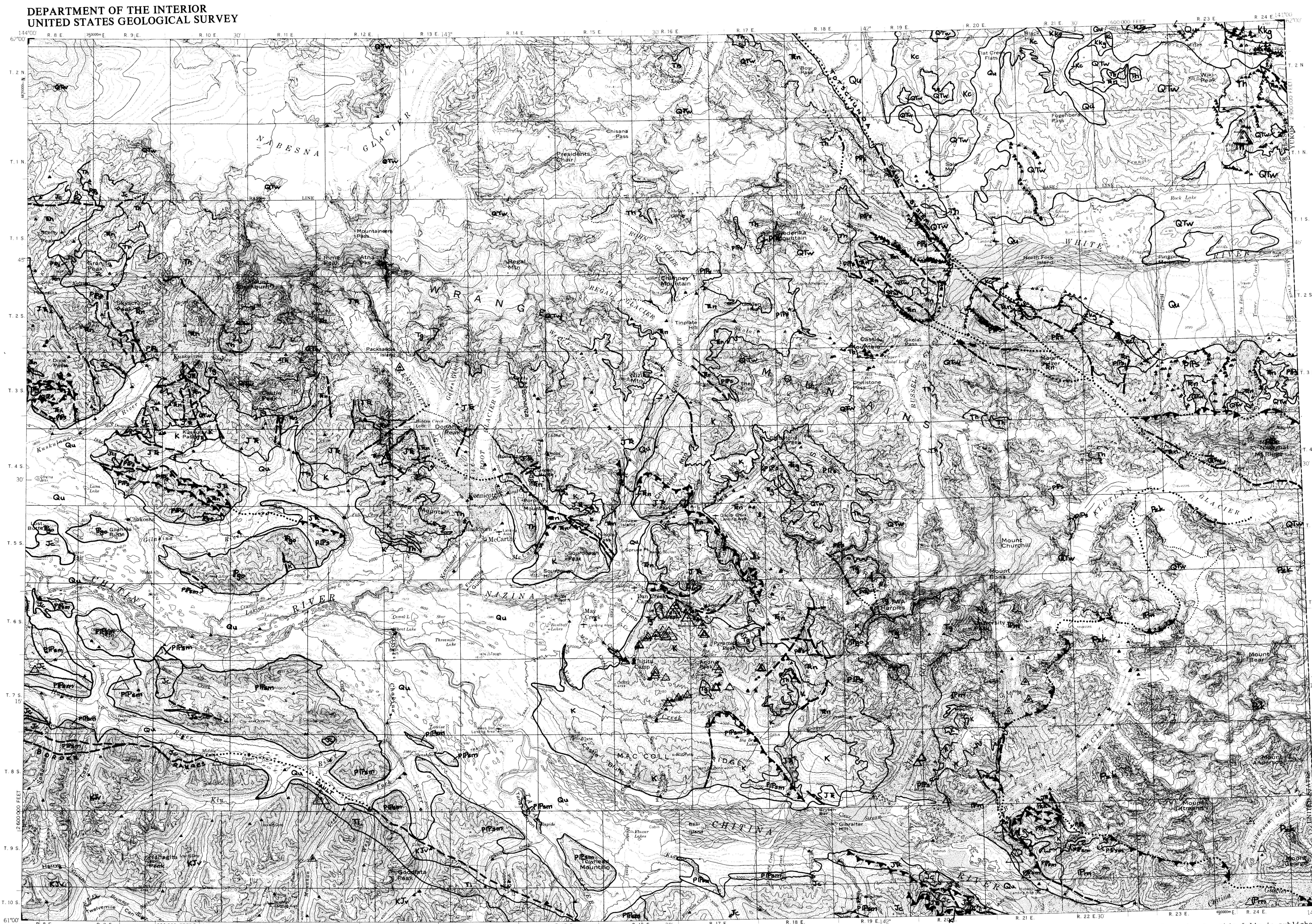


MISCELLANEOUS FIELD STUDIES MAP MF-773-G  
FOLIO OF THE MCCARTHY QUADRANGLE, ALASKA

EXPLANATION FOR GENERALIZED GEOLOGIC MAP  
(GEOLOGY GENERALIZED BY MacKEVETT, 1976)



Base from U.S. Geological Survey, 1965  
Geology generalized by MacKevett, 1976

Background information for this folio is published as U.S. Geological Survey Circular 739, available free of charge from the U.S. Geological Survey, Reston, Va. 22092.



Table showing linear correlation coefficients between logarithmic values of the concentration of selected elements versus load, McCarthy quadrangle, Alaska [Leaders(---)indicate insufficient data.]

Analytical method-----Six-step semiquantitative spectrographic analyses																					Atomic absorption and colorimetric						J	
Element	Fe	Mg	Ca	Ti	Mn	Ag	B	Ba	Be	Co	Cr	Cu	Mo	Ni	Pb	Sc	Sr	V	Y	Zn	Zr	Au	Cu	Pb	Zn	Hg	As	
Correlation Coefficient(X100)	4	-20	-30	-6	0	14	26	26	18	-9	-16	4	17	-9	-1		-16	39	-5	2	26	6	-8	-2	37	30	28	3
Number of pairs	1128	1128	1111	1103	1128	39	938	1126	440	1124	1112	1127	670	753	1127		1125	51	1127	1124	655	1124	33	936	917	937	233	142

1/ Au, Cu, Pb, and Zn by atomic absorption analysis  
Hg by flameless atomic absorption analysis  
As by colorimetric analysis

## DISCUSSION

A geochemical survey was conducted in the McCarthey quadrangle, Alaska, to identify areas containing anomalous concentrations of various metallic and nonmetallic elements. This study incorporates the results of analyses for lead from 1,453 stream sediment and groundwater debris samples collected in the quadrangle, and analyzed by the U.S. Geological Survey between 1964 and 1976 using semiquantitative emission spectrophotometry. In addition, the study includes a large part of the analytical results of stream sediment samples from the West River area, located in the southeastern part of the quadrangle, which were collected and analyzed by the Alaskan Division of Mines and Geology (Knaebel, 1970).

The accompanying map shows the distribution and relative abundance of lead in stream sediment and glacial moraine debris samples collected. Geochemical analyses have been grouped and are represented by symbols on the map, which includes topography and generalized geology. The range of analytical values and the symbol that represents it are shown on the histogram. Graphical representation of analytical values on the map permits easy observation of any large variation resulting from separate or duplicate samples collected at the same or nearby localities.

In general, the stream sediment samples were obtained from active streams as close to the channel center as was practicable. In some cases, samples from the stream beds could be obtained. The glacial debris was collected from medial and lateral moraines on active glaciers. Samples of both stream sediments and glacial moraine debris were also obtained. In order to obtain material that could pass through a 100-mesh sieve for analysis. When a fine stream sediment sample could not be obtained, a representative fraction of the smallest available rock fragments in the stream bed or on the moraine was collected. The glacial debris and moraines was collected through the same sieve opening for analysis. The lead analyses may help to locate potential occurrences of concealed mineral deposits, particularly large placer deposits of copper and molybdenum. The thorium and uranium stratigraphic mineral deposits.

The arithmetic and geometric mean values of lead in stream sediments and glacial debris from the McCarthy quadrangle are 15 and 14 ppm, respectively. Based on an evaluation of the statistical data given in the accompanying histogram, lead values ranging from N(10) to 20 ppm are classified as background values. The values between 20 and 30 ppm are classified as values near the background level, and values greater than 30 ppm are considered to be significantly anomalous.

A geochemical interpretation of the distribution and abundance of lead in samples from stream sediment and glacial moraine deposits collected in the McCarthy quadrangle is not complicated or unduly influenced by results derived from the Middle and (or) Upper Cretaceous Niobrara and Greenstone sediments in the case of some other elements. The galenite in the McCarthy quadrangle has a regional average value of 10 ppm lead and does not seem to have any affinity with the Kennecott-type copper deposits. The initial study of the geographical distribution of lead anomalies suggests that most of the

is related to occurrences of marble in Devonian(?) Kashawulsh, and Pennsylvanian Permian Skolai Groups associated with Pennsylvanian monzonitic-granitic complexes, or Cretaceous marine sedimentary rocks associated with Tertiary felsic hypabyssal and gabbroic intrusive rocks. Statistical analysis indicates a significant positive correlation coefficient between lead and the following elements: barium, strontium, zinc, and mercury.

barium, strontium, zinc, and lead. The high coefficients suggest sulfide ore association. The positive correlation of lead with boron and beryllium is difficult to explain and may be the result of felsic intrusions in marine sediments. The lack of correlation of lead with many other elements may be indicative of relative elemental mobilities in a weathering environment. This lack of correlation may result from metal contamination from the Ni-

Because erratic, biased, and in many widely separated sample localities were used in this project, undue emphasis may be placed on anomalous lead values occurring in only a few samples in a given area. In all geochemical interpretation has been made using associated elements in combination with geological, structural, and geophysical

More detailed geological, analytical, statistical data for geochemical studies of specific areas in the McCarthy quadrangle are found in reports by MacKevett and Smith (1971), Winkler and MacKevett (1970), Knaebel (1971), MacKevett and Smith (1971).

In addition to being a mineable component of considerable economic value, lead is an important pathfinder element that can be used in the search for porphyry, telethermal, and stratiform-type deposits. Lead often

The distributions of gold, molybdenum, silver, and arsenic in rocks, together with the distributions of copper, gold, lead, zinc, and mercury in stream sediments and alluvial debris, may reveal zoning patterns that are related to undiscovered mineral deposits.

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Public Inquiries Office, Anchorage, Alaska

Stream sediment samples collected in the area south of the Chitina River show little evidence to suggest strong or extensive leaching or mineralization; only a few stream sediment samples contain anomalous concentrations of lead. Some of these may be associated with the intrusion of the Jurassic Chitina Valley batholith, but the intrusion of the Chitina Valley batholith intrusion into metamorphosed rocks of the Skolai Group, in the relative vicinity of the O'Hara prospect (?), is not known, and a few samples may be associated with the intrusion of Tertiary granodiorite and tonalite into the Jurassic (?) and Cretaceous Valdez Group in juxtaposition with the Border Ranges fault, and the southern contact of the Valdez Group. The lead deposits probably do not contain major lead deposits; however, the occurrence of scattered gold, silver, arsenic, and other trace anomalies in the area may require more detailed sampling and analysis to be conducted.

geological studies show that anomalous lead values were detected in stream sediments collected adjacent to the Totschunda fault system (T. 3 S., R. 4 E.), and to the northeast, in the White River area; these samples were from the Totschunda area by the Alaska Division of Mines and Geology and are described in detail in a report by Knaebel (1970). It is possible that some of the anomalies indicate mineralization associated with the Cretaceous Klein Creek pluton, a mainly granodioritic complex which is located to the northeast corner of the Totschunda area. The anomalies occur along the north and northeast corners of the quartzangle, and south of the White River on the north flank of Mount Sulzer (T. 3 S., R. 21 E.). Both positive and negative aeromagnetic anomalies are present in the area. In the Totschunda area, the aeromagnetic anomalies are in the same generalization for

area but support for major mineralization is not strong. The associated geochemical anomalies in stream sediments are not strong. Strong copper anomalies and silver in panned concentrates and a few anomalous amounts of arsenic and lead in stream sediment samples occur in the same general area. The evidence for the occurrence of a major porphyry mineral system in the area does not appear conclusive from the analyses alone. The Klein Creek panned concentrates were more detailed investigation, especially in view of their association with porphyry copper deposits in the Nabesna quadrangle (Richter et al., 1975).

others, 1975). Lead anomalies were detected in samples derived from streams draining nonmetamorphic rocks in the Kalkavul-Skoki Group, with rocks of the Kalkavul-Skoki Group in the southeastern part of quadrangle sites are in the general vicinity of the Hargreaves prospect (T. 10 N., R. 4 E., S. 12 N.). Anomalous concentrations of lead, arsenic, mercury, and copper were detected in the sediment and in the sediment from this same locality. Outcrops cover several square kilometers in the northern and northeastern portion and post-erosion aeromagnetic anomalies occur locally (Case and Mackevett, 1976). The intensity of the aeromagnetic anomalies and the small tin anomalies. The presence of anomalies in all of these elements is consistent with the presence of unmineralized porphyry copper and polymetallic deposits related to the intrusive complex, in addition to the volcanic and igneous rocks.

Highly anomalous and extensive lead was detected in stream sediments from the Creek, Nikolai Butte, Williams Peak, Pyralis Peak, Andrus Peak, and Mount Bonanza. The lead is south-central (S., R. 16 E.), located in the area of the stream drainage. The anomalies are considered to be extremely significant. An intrusion of Tertiary granodiorite and tonalite, which is small outcropping plutons, is inferred to underlie much of the area. These intrusions are probably related to the Toiyabe National Park complex exposure to the University Range (S. 18 E. to the northeast). In addition to lead, anomalous concentrations of copper, silver, arsenic, mercury, antimony, gold, and molybdenum detected in samples of rock and stream sediment suggest that the mineralization occurs in this area. Prospecting anomalies are present

Strong positive magnetic anomalies are observed in the area of the mine (Case and MacKevett, 1976) and hydrothermal alteration is widespread. The altered rocks are visible in outcrops. The area has been extensively placer mined for gold. The area is known to contain veins of gold-arsenic-antimony, and gold-copper-molybdenum. The associations of these elements strongly suggest the possibility of concealed porphyry copper, molybdenum, or other types of deposits. The area is representative of peripheral halos of porphyry copper deposits.

A complete set of coordinates for sites, as well as statistical and data, obtained 1974-1976 for lead in sediments and glacial moraine debris collected in the McCarthy quadrangle is available together with details of sample collection, preparation, analysis, data storage and retrieval, in U.S. Geological Survey Open-File 76-824 (O'Leary and others, 1976) and 76-825 (O'Leary, Yoccoz, and others, 1977).

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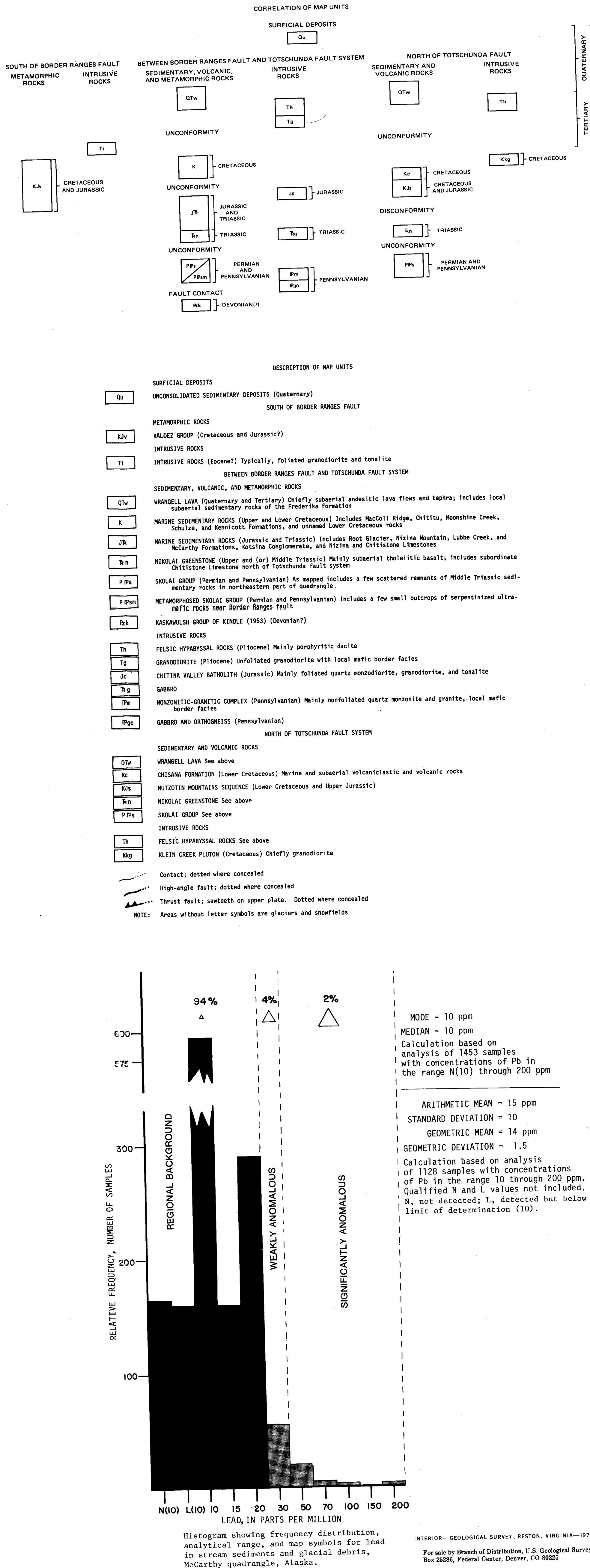
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